Instabilities/Injectors
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Harold Hahn has measured the abort kicker transverse impedance. For 5 identical modules and PFNs the beam will see

$$R_x(f) \approx \frac{R_{sh}}{\dfrac{f}{f_r} + jQ\left\{1 - \left(\dfrac{f}{f_r}\right)^2\right\}}$$

with $R_{sh} = 9\text{M}\Omega/\text{m}$, $f_r = 7\text{MHz}$, $Q = 15$. Horizontal only
From the 1993 study the resistive wall impedance at the revolution frequency (78kHz) is $R_x \approx R_y \approx (1 - j)9\text{M}\Omega/\text{m}$.

Coupled bunch study to see effect/non-effect of kicker impedance.
Fill the ring with close to symmetric fill ~ 60 bunches.
After fill change gap voltage and/or chromaticity until unstable.
40MHz low pass a BPM difference signal and sample at 100MHz.
self trigger the scope and acquire 10^6 samples or 10ms of data.
This gives a frequency resolution of 100 Hz $\ll$ 78 kHz so coupled bunch modes will be distinguishable.
Horizontal resistive wall growth rate peaks at the lowest unstable sideband $(29 - Q_x)f_{rev} \approx 62\text{kHz}$ and drops like $1/\sqrt{f}$.
Kicker driven mode will show up at $f \approx 7 \text{ MHz} - 60f_{rev} = 2.3 \text{ MHz}$
Kicker case clearly distinguishable from resistive wall.
Harold suggests we could do a dedicated experiment and measure the voltage induced on the kicker as well.
If kicker is significantly worse than resistive wall, think about changes.
Could stagger effective capacitance of PFNs (smaller peak but broader band).

Studies in Booster and AGS

- IBS on AGS injection porch, perhaps using longitudinal echoes

- Transverse instability at AGS injection and after γ_t
  sensitivity to chromaticity, can we model it in general?

- Bucket distortion and microwave instability near γ_t in AGS

- Au transverse emittance shrinks on AGS injection porch?

- Measuring 1 turn map in AGS with AC dipole. (Low pass analog BPM or use bunch tracker and digitize with scope. Perhaps diagnostic memory in damper?)

An AGS Puzzle:
4 sextupole correction strings are required to simultaneously correct the $3Q_x = 26$ and $Q_x + 2Q_y = 26$ resonances in Guignard picture. In AGS the correction currents vary non-linearly with the current in the horizontal sextupoles. Why? Quantitative explanations?